

General

Title

Perioperative care: percentage of patients, regardless of age, who undergo central venous catheter (CVC) insertion for whom CVC was inserted with all elements of maximal sterile barrier technique, hand hygiene, skin preparation and, if ultrasound is used, sterile ultrasound techniques followed.

Source(s)

American Society of Anesthesiologists (ASA). Prevention of central venous catheter (CVC)-related bloodstream infections. Schaumburg (IL): American Society of Anesthesiologists (ASA); 2015 Oct 1. 2 p.

Measure Domain

Primary Measure Domain

Clinical Quality Measures: Process

Secondary Measure Domain

Does not apply to this measure

Brief Abstract

Description

This measure is used to assess the percentage of patients, regardless of age, who undergo central venous catheter (CVC) insertion for whom CVC was inserted with all elements of maximal sterile barrier technique, hand hygiene, skin preparation and, if ultrasound is used, sterile ultrasound techniques followed.

Rationale

Catheter-related bloodstream infection is a costly complication of central venous catheter (CVC) insertion, but may be avoided with routine use of aseptic technique during catheter insertion. This measure is constructed to require that all of the listed elements of aseptic technique are followed and documented. Hospital-acquired bloodstream infections are a common complication that leads to increased costs and mortality (Smith, Meixler, & Simberkoff, 1991). It is estimated that approximately 51% of hospital-

acquired bloodstream infections occur in an intensive care unit (ICU), with the presence of a central venous catheter being the largest risk factor for the development of a bloodstream infection in the hospital (Wisplinghoff et al., 2004). Catheter-related bloodstream infections (CRBSIs) commonly occur when the catheter becomes contaminated by microbes on the skin during insertion. The use of maximal sterile barriers, including sterile gloves, long-sleeved sterile gown, mask, cap, and full-sized sterile drape, during insertion of the catheter has been shown to cost effectively reduce CRBSI rates compared to the use of less stringent precautions (Raad et al., 1994; Sheretz et al., 2000; Carrer et al., 2005; Lee, Jung, & Choi, 2008).

Clinical Recommendation Statements:

Maximal sterile barrier precautions: Use maximal sterile barrier precautions, including the use of a cap, mask, sterile gown, sterile gloves, and a sterile full body drape, for the insertion of CVCs, peripherally inserted central catheters (PICCS), or guidewire exchange (Centers for Disease Control and Prevention [CDC], 2011).

Hand hygiene: Perform hand hygiene procedures, either by washing hands with conventional soap and water or with alcohol-based hand rubs (ABHR).

Skin Preparation: Prepare clean skin with a greater than 0.5% chlorhexidine preparation with alcohol before central venous catheter and peripheral arterial catheter insertion and during dressing changes. If there is a contraindication to chlorhexidine, tincture of iodine, an iodophor, or 70% alcohol can be used as alternatives.

Sterile Ultrasound: The Food and Drug Administration recommends that policies and clinical practice standards be reviewed to ensure the use of sterile ultrasound gel. Once a container of sterile or non-sterile ultrasound gel is opened, it is no longer sterile and contamination during ongoing use is possible.

Evidence for Rationale

American Society of Anesthesiologists (ASA). Prevention of central venous catheter (CVC)-related bloodstream infections. Schaumburg (IL): American Society of Anesthesiologists (ASA); 2015 Oct 1. 2 p.

Carrer S, Bocchi A, Bortolotti M, Braga N, Gilli G, Candini M, Tartari S. Effect of different sterile barrier precautions and central venous catheter dressing on the skin colonization around the insertion site. *Minerva Anestesiol.* 2005 May;71(5):197-206. [PubMed](#)

Centers for Disease Control and Prevention (CDC). 2011 guidelines for the prevention of intravascular catheter-related infections. [internet]. Atlanta (GA): Centers for Disease Control and Prevention (CDC); 2011 Apr 1.

Lee DH, Jung KY, Choi YH. Use of maximal sterile barrier precautions and/or antimicrobial-coated catheters to reduce the risk of central venous catheter-related bloodstream infection. *Infect Control Hosp Epidemiol.* 2008 Oct;29(10):947-50. [PubMed](#)

Raad II, Hohn DC, Gilbreath BJ, Suleiman N, Hill LA, Bruso PA, Marts K, Mansfield PF, Bodey GP. Prevention of central venous catheter-related infections by using maximal sterile barrier precautions during insertion. *Infect Control Hosp Epidemiol.* 1994 Apr;15(4 Pt 1):231-8. [PubMed](#)

Sherertz RJ, Ely EW, Westbrook DM, Gledhill KS, Streed SA, Kiger B, Flynn L, Hayes S, Strong S, Cruz J, Bowton DL, Hulgian T, Haponik EF. Education of physicians-in-training can decrease the risk for vascular catheter infection. *Ann Intern Med.* 2000 Apr 18;132(8):641-8. [PubMed](#)

Smith RL, Meixler SM, Simberkoff MS. Excess mortality in critically ill patients with nosocomial

bloodstream infections. Chest. 1991 Jul;100(1):164-7. [PubMed](#)

Wisplinghoff H, Bischoff T, Tallent SM, Seifert H, Wenzel RP, Edmond MB. Nosocomial bloodstream infections in US hospitals: analysis of 24,179 cases from a prospective nationwide surveillance study. Clin Infect Dis. 2004 Aug 1;39(3):309-17. [PubMed](#)

Primary Health Components

Perioperative care; central venous catheter (CVC)-related bloodstream infections; maximum sterile barrier technique; hand hygiene; skin preparation; sterile ultrasound techniques

Denominator Description

All patients, regardless of age, who undergo central venous catheter (CVC) insertion

Numerator Description

Patients for whom central venous catheter (CVC) was inserted with all elements of maximal sterile barrier technique, hand hygiene, skin preparation and, if ultrasound is used, sterile ultrasound techniques followed (see the related "Numerator Inclusions/Exclusions" field)

Evidence Supporting the Measure

Type of Evidence Supporting the Criterion of Quality for the Measure

A formal consensus procedure, involving experts in relevant clinical, methodological, public health and organizational sciences

One or more research studies published in a National Library of Medicine (NLM) indexed, peer-reviewed journal

Additional Information Supporting Need for the Measure

Unspecified

Extent of Measure Testing

Dataset

Medicare Limited Data Set Carrier SAF – 5% File; Anesthesia Quality Institute (AQI) National Anesthesia Clinical Outcomes Registry (NACOR)

Reliability

Reliability was calculated according to the methods outlined in a technical report prepared by J.L. Adams titled *The Reliability of Provider Profiling: A Tutorial*. In this context, reliability represents the ability of a measure to confidently distinguish the performance of one physician from another. As discussed in the report: "Conceptually, it is the ratio of signal to noise. The signal in this case is the proportion of variability in measured performance that can be explained by real differences in performance. There are 3 main drivers of reliability; sample size, differences between physicians, and measurement error."

According to this approach, reliability is estimated with a beta-binomial model. The beta-binomial model is appropriate for measuring the reliability of pass/fail measures such as those proposed.

Reliability was tested on providers, practices and facilities where at least 2 cases were reported.

Reliability for the process *Prevention of Central Venous Catheter (CVC)-related Bloodstream Infections* measure is consistently greater than 0.9, and thus can be considered to be very good. This reflects the inclusion of that measure in public reporting programs, the number of years that the measure has been reported and the number of cases available to test and analyze. In the three years of NACOR data that as analyzed, reliability has remained stable and consistent but performance rates, as increases in data capture grew, fell in 2014.

Validity

Face validity of the measure score as an indicator of quality was systematically assessed as follows. After the measure was fully specified, a group of experts was assembled to rate face validity. The experts included 19 physicians.

The developer provided the detailed measure specifications to the experts and asked them to rate their agreement with the following statement: The scores obtained from the measure as specified will provide an accurate reflection of quality and can be used to distinguish good from poor quality.

The rating scale had five levels (1 to 5) with the following narrative anchors: 1 = Disagree; 3 = Moderate Agreement; 5 = Agree

As additional data and information become available on this measure, the American Society of Anesthesiologists (ASA) intends to conduct further measure validity testing on this measure.

The results of the assessment of face validity indicate that an independent group of experts (different from those who advised on measure development) had high levels of agreement with the statement: "The scores obtained from the measure as specified will provide an accurate reflection of quality and can be used to distinguish good and poor quality."

Mean rating = (4.16 out of 5)

This measure was examined through a group of experts. Out of the 19 participants, 17 agreed that the scores from the measure as specified would provide an accurate reflection of quality and 2 disagreed.

Evidence for Extent of Measure Testing

National Quality Forum (NQF) measure submission form: prevention of central venous catheter (CVC)-related bloodstream infections. Washington (DC): National Quality Forum (NQF); 2015 Apr 10. 33 p.

State of Use of the Measure

State of Use

Current routine use

Current Use

not defined yet

Application of the Measure in its Current Use

Measurement Setting

Ambulatory Procedure/Imaging Center

Hospital Inpatient

Hospital Outpatient

Professionals Involved in Delivery of Health Services

not defined yet

Least Aggregated Level of Services Delivery Addressed

Individual Clinicians or Public Health Professionals

Statement of Acceptable Minimum Sample Size

Does not apply to this measure

Target Population Age

All ages

Target Population Gender

Either male or female

National Strategy for Quality Improvement in Health Care

National Quality Strategy Aim

Better Care

National Quality Strategy Priority

Health and Well-being of Communities

Making Care Safer

Prevention and Treatment of Leading Causes of Mortality

Institute of Medicine (IOM) National Health Care Quality Report Categories

IOM Care Need

Getting Better

Staying Healthy

IOM Domain

Effectiveness

Safety

Data Collection for the Measure

Case Finding Period

Unspecified

Denominator Sampling Frame

Patients associated with provider

Denominator (Index) Event or Characteristic

Therapeutic Intervention

Denominator Time Window

not defined yet

Denominator Inclusions/Exclusions

Inclusions

All patients, regardless of age, who undergo central venous catheter (CVC) insertion

Exclusions

Unspecified

Exclusions/Exceptions

not defined yet

Numerator Inclusions/Exclusions

Inclusions

Patients for whom central venous catheter (CVC) was inserted with all elements of maximal sterile barrier technique, hand hygiene, skin preparation and, if ultrasound is used, sterile ultrasound techniques followed

Note:

Maximal Sterile Barrier Technique: Includes all of the following elements: cap AND mask AND sterile gown AND sterile gloves AND sterile full body drape.

Sterile Ultrasound Techniques: Require sterile gel and sterile probe covers.

Exclusions

Unspecified

Numerator Search Strategy

Fixed time period or point in time

Data Source

Administrative clinical data

Registry data

Type of Health State

Does not apply to this measure

Instruments Used and/or Associated with the Measure

Unspecified

Computation of the Measure

Measure Specifies Disaggregation

Does not apply to this measure

Scoring

Rate/Proportion

Interpretation of Score

Desired value is a higher score

Allowance for Patient or Population Factors

not defined yet

Standard of Comparison

not defined yet

Identifying Information

Original Title

Prevention of central venous catheter (CVC)-related bloodstream infections.

Measure Collection Name

Perioperative Care

Submitter

American Society of Anesthesiologists - Medical Specialty Society

Developer

American Society of Anesthesiologists - Medical Specialty Society

Physician Consortium for Performance Improvement® - Clinical Specialty Collaboration

Funding Source(s)

Unspecified

Composition of the Group that Developed the Measure

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Financial Disclosures/Other Potential Conflicts of Interest

Conflicts, if any, are disclosed in accordance with the Physician Consortium for Performance Improvement® conflict of interest policy.

Endorser

National Quality Forum - None

NQF Number

not defined yet

Date of Endorsement

2015 Dec 10

Measure Initiative(s)

Physician Quality Reporting System

Adaptation

This measure was not adapted from another source.

Date of Most Current Version in NQMC

2015 Oct

Measure Maintenance

Annually

Date of Next Anticipated Revision

2016 Nov

Measure Status

This is the current release of the measure.

This measure updates a previous version: American Society of Anesthesiologists, Physician Consortium for Performance Improvement®. Anesthesiology and critical care physician performance measurement set. Chicago (IL): American Medical Association (AMA); 2008 Oct. 21 p. [5 references]

Measure Availability

Source available from the [American Society of Anesthesiologists \(ASA\) Web site](#) .

For more information, contact ASA at 1061 American Lane Schaumburg, IL 60173-4973; Phone: 847-825-5586; Fax: 847-825-1692; E-mail: info@asahq.org; Web site: asahq.org .

NQMC Status

This NQMC summary was completed by ECRI Institute on January 2, 2008. The information was verified by the measure developer on January 11, 2008.

This NQMC summary was retrofitted into the new template on June 13, 2011.

This NQMC summary was edited by ECRI Institute on April 27, 2012.

Stewardship for this measure was transferred from the PCPI to the ASA. ASA informed NQMC that this measure was updated. This NQMC summary was updated by ECRI Institute on March 23, 2016. The information was verified by the measure developer on April 26, 2016.

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Production

Source(s)

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